

- III. Claims 20-29, drawn to a method for producing a fuel cell electrode, classified in class 429, subclass 209
- IV. Claims 30-39, drawn to a direct methanol fuel cell, classified in class 429, subclass 13

Applicant respectfully urges that *Claims 30-39 are not drawn to a direct methanol fuel cell as stated by the Examiner*, but rather, Claims 30-39 are drawn to a method for reducing or eliminating methanol crossover from the anode electrode to the cathode electrode of a direct methanol fuel cell.

The Examiner has indicated that the inventions are distinct as follows:

Inventions II and I have been indicated to be related as combination and subcombination and inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the Examiner has indicated that the combination as claimed does not require the particulars of the subcombination as claimed because the combination comprises a cathode, anode and proton exchange membrane that are patentability distinct and the subcombination has separate utility such as in a solid oxide fuel cell.

Inventions III and I have been indicated to be unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different designs, modes of operation, and effects (MPEP § 802.01 and § 806.06). In the instant case, the Examiner has indicated that the inventions have different modes of operation. In particular, the Examiner has indicated that Invention I is a fuel cell whereas Invention III is a process for making an electrode.

Inventions IV and I have been indicated to be unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different designs, modes of operation, and effects (MPEP § 802.01 and § 806.06). In the instant case, the Examiner has indicated that the inventions have different modes of operation. In particular, the Examiner has indicated that Invention IV requires methanol fuel and Invention I can use methane as a fuel.

Inventions III and II have been indicated to be related as process of making and product made. The inventions are distinct if (1) the process as claimed can be used to make another and materially different product or (2) the product as claimed can be made by another and materially different process. In the instant case, the Examiner indicates that the product as claimed can be made by another materially different process because the electrode has a catalyst particle binder already provided and no mixing is required by the process.

Inventions IV and II have been indicated to be unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different designs, modes of operation, and effects (MPEP § 802.01 and § 806.06). In the instant case, the Examiner has indicated that the inventions have different modes of operation on the basis that Invention IV is directed to a methanol PEM fuel cell with a proton exchange membrane that can be patentably distinct and Invention II can be an electrode used in a solid oxide fuel cell.

Inventions IV and III have been indicated to be unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different designs, modes of operation, and effects (MPEP § 802.01 and § 806.06). In the instant case, the Examiner has indicated that the inventions have different modes of operation on the basis that Invention IV relates to a methanol fuel cell and Invention III relates to a process for making an electrode.

For the following reasons, Applicant respectfully traverses the election/restriction requirements by the Examiner.

Regarding Inventions II and I, Applicant respectfully urges, contrary to the assertion by the Examiner, that, although related as combination and subcombination, the inventions are not, in fact, distinct. Claim 1 recites:

“In a fuel cell comprising an anode electrode, a cathode electrode and a proton exchange membrane electrolyte disposed therebetween, the improvement comprising:

an anode catalyst layer disposed on one of an electrolyte facing surface of said anode electrode and an anode electrode facing surface of said electrolyte, said anode catalyst layer comprising a proton conductive material and an electron conductive material substantially uniformly dispersed throughout said catalyst layer.”

Claim 15 recites:

“An electrode comprising:

a gas diffusion layer; and

an anode catalyst layer disposed on one surface of said gas diffusion layer, said anode catalyst layer comprising a plurality of catalyst particles and a catalyst particle binder, said catalyst particle binder comprising at least one proton conductive material and at least one electron conductive material.”

In order to be distinct, it must be shown, among other things, that the combination as claimed does not require the particulars of the subcombination as claimed for patentability (MPEP § 806.05(c)). Applicant respectfully urges that, in fact, the combination of Claim 1 does requires the particulars of the subcombination of Claim 15 for patentability. It should be noted that Claim 1 is a Jepson claim; thus, the elements recited in the preamble are conventional and the elements in the body of the claim constitute improvements. Thus, Claim 1 recites *an improvement* to the fuel cell in which an anode catalyst comprising “a proton conductive material and an electron conductive material” is disposed on the anode electrode. It also should be noted, as discussed, for example, at Page 7, line 20 to Page 8, line 1 of the specification, that conventional polymer electrolyte membrane fuel cells comprise

electrodes comprising a gas diffusion layer. Claim 15 is directed to an electrode which, in addition to a gas diffusion layer, comprises an anode catalyst comprising “at least one proton conductive material and at least one electron conductive material.” It is, thus, an electrode comprising an anode catalyst comprising both a proton conductive material and an electron conductive material which is being relied upon for patentability, the same elements of which are required by Claim 1. *Applicant further respectfully urges that, if Claim 15 is determined to be allowable, then, of necessity, Claim 1 would also have to be allowable.* Accordingly, Applicant respectfully urges that the requirement of an election/restriction with respect to Inventions II and I is not proper since the combination as claimed in Claim 1 does, in fact, require the particulars of the subcombination as claimed in Claim 15 for patentability.

Regarding Inventions III and I, the Examiner has indicated that they are unrelated, i.e. independent, on the basis that the inventions have different modes of operation. In particular, the Examiner has indicated that Invention I is a fuel cell whereas Invention III is a process for making an electrode. Applicant respectfully urges that Inventions III and I are, in fact, related inventions. As previously indicated, Claim 1 recites an improvement to a fuel cell in the form of an improved electrode, i.e. an electrode comprising an anode catalyst comprising “a proton conductive

material and an electron conductive material". *Claim 20 is drawn to a method for producing the electrode of Invention I recited in Claim 1.* Accordingly, Applicant respectfully urges that Inventions III and I are related as a product (electrode) and a process for making. In this case, in order for the election/restriction requirement to be proper, the Examiner must show that Inventions III and I are distinct, which distinctness has not been shown by the Examiner to exist. Accordingly, in the absence of a showing of distinctness by the Examiner, Applicant respectfully urges that the requirement of an election/restriction with respect to Inventions III and I is not proper.

Regarding Inventions IV and I, the Examiner has indicated that they are unrelated, i.e. independent, on the basis that the inventions have different modes of operation. In particular, the Examiner argues that Invention IV requires methanol fuel and Invention I can use methane as a fuel. Applicant respectfully urges that Inventions IV and I are, in fact, related. As previously indicated, Invention IV (Claims 30-39) is not a direct methanol fuel cell as stated by the Examiner. Claim 30 states as follows:

"In a direct methanol fuel cell comprising an anode electrode, a cathode electrode and a proton exchange membrane electrolyte disposed therebetween, *a method for one of reducing and substantially eliminating methanol crossover from said anode electrode to said cathode electrode, the method comprising the steps of:*
applying a catalyst ink comprising an electron conductive material and a proton conductive material to one of an electrolyte facing surface of said anode

electrode and an anode electrode facing surface of said proton exchange membrane electrolyte.” (Emphasis added)

Applicant respectfully urges that Claim 30 is directed to a method in which a catalyst ink comprising an electron conductive material and a proton conductive material is applied to the anode electrode of a direct methanol fuel cell in order to reduce or eliminate methanol crossover between the anode electrode and the cathode electrode of the fuel cell. That is, *Claim 30 recites a method for producing the electrode of Claim 1.* Thus, Applicant respectfully urges that Inventions IV and I are not independent, i.e. unrelated, as indicated by the Examiner. In this case, in order for the election/restriction requirement to be proper, the Examiner must show that Inventions IV and I are distinct, which distinctness has not been shown by the Examiner to exist. Accordingly, in the absence of a showing of distinctness by the Examiner, Applicant respectfully urges that the requirement of an election/restriction with respect to Inventions IV and I is not proper.

Regarding Inventions III and II, the Examiner has indicated that, although the inventions are related as product and process for making the product, the inventions are distinct because “the product as claimed can be made by another materially different process because the electrode has a catalyst particle binder already provided and no mixing was required by the process.” Applicant respectfully disagrees. The argument of distinctness made by the Examiner is based upon an

allegation that no mixing of catalyst particles and binder is required by the claimed process. Claim 20 states as follows:

“A method for producing a fuel cell electrode comprising the steps of:
mixing a plurality of anode catalyst particles with a binder material,
said binder material comprising an electron conductive material and a proton conductive material, forming a proton-conductive and electron-conductive anode catalyst ink; and

applying said proton-conductive and electron-conductive anode catalyst ink to an anode electrode gas diffusion layer, forming a fuel cell anode electrode.”
(Emphasis added)

Accordingly, given the fact that the process to produce the product does include a mixing step, Applicant respectfully urges that the Examiner has not met the burden of establishing the distinctness of Inventions III and II. Accordingly, in the absence of a showing of distinctness by the Examiner, Applicant respectfully urges that the requirement of an election/restriction with respect to Inventions III and II is not proper.

Regarding Inventions IV and II, the Examiner has indicated that they are unrelated, i.e. independent, on the basis that the inventions have different modes of operation. In particular, the Examiner has indicated that the inventions have different modes of operation on the basis that Invention IV is directed to a methanol PEM fuel cell with a proton exchange membrane that can be patentably distinct and Invention II can be an electrode used in a solid oxide fuel cell. Applicant respectfully disagrees.

As previously indicated, *Invention IV is not directed to a direct methanol fuel cell* as indicated by the Examiner, but rather recites a method for reducing or eliminating methanol crossover between the anode and cathode of the fuel cell by preparing the electrode of Invention II. Thus, Applicant respectfully urges that Inventions IV and II are not independent, i.e. unrelated, as indicated by the Examiner. In this case, in order for the election/restriction requirement to be proper, the Examiner must show that Inventions IV and II are distinct, which distinctness has not been shown by the Examiner to exist. Accordingly, in the absence of a showing of distinctness by the Examiner, Applicant respectfully urges that the requirement of an election/restriction with respect to Inventions IV and II is not proper.

Regarding Inventions IV and III, the Examiner has indicated that they are unrelated, i.e. independent, on the basis that the inventions have different modes of operation. In particular, the Examiner has indicated that the inventions have different modes of operation on the basis that Invention IV relates to a methanol fuel cell and Invention III relates to a process for making an electrode. Applicant respectfully disagrees.

As previously indicated, *Invention IV is not directed to a direct methanol fuel cell* as indicated by the Examiner, but rather recites a method for reducing or eliminating methanol crossover between the anode and cathode of the fuel

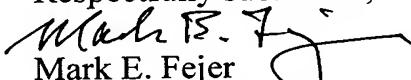
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cell by preparing the electrode of Invention II. That is, *the step of the claimed method comprises preparing an electrode, which method is clearly related to Invention III, which relates to a process for preparing an electrode.* Thus, Applicant respectfully urges that Inventions IV and III are not independent, i.e. unrelated, as indicated by the Examiner. In this case, in order for the election/restriction requirement to be proper, the Examiner must show that Inventions IV and III are distinct, which distinctness has not been shown by the Examiner to exist. Accordingly, in the absence of a showing of distinctness by the Examiner, Applicant respectfully urges that the requirement of an election/restriction with respect to Inventions IV and III is not proper.

Notwithstanding Applicant's traversal of the election/restriction requirement, Applicant hereby elects to prosecute Claims 1-14 of the application directed to Invention I.

Applicant respectfully urges that this application is now in condition for examination and, thus, respectfully request early allowance.

Respectfully submitted,


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